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CLAIMS:

1. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases over the substrate; and

while depositing the silicon dioxide, maintaining a temperature of the substrate at greater than or equal to about 500° C.

2. The method of claim 1 further comprising:

forming openings in the substrate; and

depositing the silicon dioxide within the openings.

3. The method of claim 1 wherein the gases comprise SiH_4 and oxygen.

4. The method of claim 1 wherein the gases comprise SiH_4, oxygen and argon.

5. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases over the substrate; and

not cooling the substrate with a coolant gas while depositing the silicon dioxide.

6. The method of claim 5 further comprising maintaining a temperature of the substrate at greater than or equal to 500° C during the depositing.

7. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases over the substrate at a deposition rate;

while depositing, etching the deposited silicon dioxide with the plasma at an etch rate; and

during the etching and depositing, maintaining a temperature of the substrate at greater than or equal to about 500° C.

8. The method of claim 7 wherein the gases comprise SiH_4 and oxygen.

9. The method of claim 7 wherein the gases comprise SiH_4, oxygen and argon.

10. The method of claim 7 further comprising:

forming openings in the substrate; and

depositing the silicon dioxide within the openings.

11. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases over the substrate at a deposition rate;

while depositing, etching the deposited silicon dioxide with the plasma at an etch rate; and

during the etching and depositing, maintaining a temperature of the substrate at greater than or equal to about 500° C, the maintaining a temperature comprising not exposing the substrate to a coolant gas.

12. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases over the substrate at a deposition rate;

while depositing, etching the deposited silicon dioxide with the plasma at an etch rate under elevated temperature conditions to achieve a ratio of deposition rate to etch rate that is at least two-times greater than would otherwise occur under identical processing conditions of an identical substrate at lower temperature conditions.

13. A method of forming a shallow trench isolation region, comprising the following sequential steps:

forming openings extending into a substrate, the openings extending less than or equal to about 1 micron into the substrate;

heating the substrate in the presence of oxygen to form a first layer of silicon dioxide within the openings; and

forming a second layer of silicon dioxide within the openings to fill the openings, the forming the second layer of silicon dioxide comprising:

forming a high density plasma proximate the substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

maintaining the substrate at a temperature of at least about 500° C; and

while maintaining the substrate at said temperature, depositing the silicon dioxide formed from the gases within the openings.

14. The method of claim 13 wherein the gases comprise SiH_4 and oxygen.

15. The method of claim 13 wherein the maintaining the temperature of the substrate comprises heating the substrate with the plasma.

16. The method of claim 13 wherein the silicon dioxide is deposited at a deposition rate, and further comprising etching the deposited silicon dioxide with the plasma at an etch rate, a ratio of the deposition rate to the etch rate being at least about 4:1.

17. The method of claim 13 wherein the ratio of the deposition rate to the etch rate is at least about 6:1.

18. The method of claim 13 wherein the ratio of the deposition rate to the etch rate is at least about 9:1.

19. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate, the plasma comprising silicon dioxide precursors, the substrate comprising an opening having an aspect ratio of at least about 1;

forming silicon dioxide from the precursors, the silicon dioxide being deposited within the opening at a deposition rate; and

while depositing, etching the silicon dioxide deposited within the opening, the etching comprising etching with the plasma at an etch rate; a ratio of the deposition rate to the etch rate being at least about 4:1.

20. The method of claim 19 wherein the opening has an aspect ratio of from about 2.5 to about 1.

21. The method of claim 19 further comprising:

placing the substrate in a reaction chamber, the reaction chamber comprising inductive coils to generate the plasma; the depositing and etching occurring in the reaction chamber;

providing a first bias to the inductive coils; and

during the etching, providing a second bias to the substrate.

22. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate, the substrate comprising an opening having an aspect ratio of at least about 1;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases within the opening at a deposition rate; and

while depositing, etching the silicon dioxide deposited within the opening with the plasma at an etch rate; a ratio of the deposition rate to the etch rate being at least about 4:1.

23. The method of claim 22 wherein the opening has an aspect ratio of from about 2.5 to about 1.

24. The method of claim 22 wherein the ratio of the deposition rate to the etch rate is at least about 6:1.

25. The method of claim 22 wherein the ratio of the deposition rate to the etch rate is at least about 9:1.

26. The method of claim 22 further comprising maintaining a temperature of the substrate at greater than or equal to about 500° C during the deposition and etching.

27. The method of claim 22 further comprising:

forming openings in the substrate; and

depositing the silicon dioxide within the openings.

28. The method of claim 22 wherein the gases comprise SiH_4 and oxygen.

29. The method of claim 22 wherein the gases comprise SiH_4, oxygen and argon.

30. The method of claim 22 wherein the gases are a mixture consisting essentially of SiH_4, oxygen and argon.

31. A method of forming a silicon dioxide layer, comprising:

forming a high density plasma proximate a substrate, the substrate comprising a step;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

depositing the silicon dioxide formed from the gases over the substrate step; and

while depositing the silicon dioxide, maintaining a temperature of the substrate at greater than or equal to about 500° C, the depositing achieving better step coverage than would otherwise occur at lower temperatures.

32. The method of claim 31 further comprising:

forming openings in the substrate; and

depositing the silicon dioxide within the openings.

33. The method of claim 31 wherein the gases comprise SiH_4 and oxygen.

34. The method of claim 31 wherein the gases comprise SiH_4, oxygen and argon.

35. A method of forming a shallow trench isolation region, comprising the following sequential steps:

forming openings extending into a substrate, the openings extending less than or equal to about 1 micron into the substrate, the substrate comprising steps at peripheries of the openings;

heating the substrate in the presence of oxygen to form a first layer of silicon dioxide within the openings; and

forming a second layer of silicon dioxide within the openings to fill the openings, the forming the second layer of silicon dioxide comprising:

forming a high density plasma proximate the substrate;

flowing gases into the plasma, at least some of the gases forming silicon dioxide;

maintaining the substrate at a temperature of at least about 500° C; and

while maintaining the substrate at said temperature, depositing the silicon dioxide formed from the gases within the openings and over the steps, the depositing achieving better step coverage than would otherwise occur at lower temperatures.

36. The method of claim 35 wherein the gases comprise SiH_4 and oxygen.

37. The method of claim 35 wherein the maintaining the temperature of the substrate comprises heating the substrate with the plasma.

38. The method of claim 35 wherein the silicon dioxide is deposited at a deposition rate, and further comprising etching the deposited silicon dioxide with the plasma at an etch rate, a ratio of the deposition rate to the etch rate being at least about 4:1.

39. The method of claim 35 wherein the ratio of the deposition rate to the etch rate is at least about 6:1.

40. The method of claim 35 wherein the ratio of the deposition rate to the etch rate is at least about 9:1.